

Response to Comments
Remedial Investigation Report
Maunabo Groundwater Contamination Site
Maunabo, Puerto Rico

Comments from Diana Cutt, EPA Hydrogeologist

1. Please consider renaming the areas of groundwater contamination from PRB Plume, FSB Plume, and Maunabo #4 Plume to cis-1,2-DEC Plume, PCE Plume, and 1.1 DCE Plume (as depicted in Figure 4-9).

Response: CDM Smith will re-name the three groundwater plumes per the comment.

2. Section 2.3: Please indicate the date of surface water and streambed porewater sampling and if the stream was a gaining or losing stream at the time of sampling. If gaining stream conditions were not captured during sampling, it may be advisable to collect samples during such conditions during any future pilot study or RD sampling events to confirm that any groundwater discharging to the stream does not pose a concern.

Response: The following sentences will be added to the end of the paragraph in Section 2.3:
“Surface water and sediment samples were collected on May 9-10, 2011; porewater samples were collected on March 11, 2011 (pumped samples) and March 25, 2011 (diffusion bag samples). The dry season in Puerto Rico includes the month of March when the porewater samples were collected. Therefore, it is most likely that the stream was at a “losing” water level. The wet season includes the month of May and it is likely the surface water samples were collected when the stream was at a “gaining” water level.”

3. Section 3.4.4.3, p. 3-7: Groundwater/Surface Water Interaction: Please rework language in the second paragraph to reflect that the Rio Maunabo is both a gaining and losing stream depending on seasonal and pumping influences.

Response: The second paragraph in Section 3.4.4.3 will be modified to read as follows: “During Round 1 (March 2011 dry period), water elevations in piezometers PZ-2, PZ-3, and PZ-4 were 10.94, 10.67, and 10.09 feet above msl, respectively, all of which are greater than groundwater elevations near the stream. The stream water elevation on the Rio Maunabo staff gauge (10.58 above feet msl) was also greater than the groundwater elevation near the stream. The stream and groundwater elevation data collected during the March 2011 dry period indicate that the groundwater table is below the stream bed, suggesting that the Rio Maunabo is a losing stream (Figure 3-9). This is likely due to a combination of seasonal lowering of the groundwater table and effects of pumping at Maunabo #1. Round 2 groundwater elevations (Figure 3-10), collected during a wet period (June 2011), are generally higher and intercept the bed of the Rio Maunabo, suggesting that the stream is gaining. Based on the RI data, the river changes from a gaining stream during the wet periods to a losing stream during the dry periods. Pumping effects from Maunabo #1 are overlaid on the seasonal pattern, lowering groundwater levels locally during both dry and wet periods. The effects of pumping are discussed further in Section 3.4.4.4 Long Term Groundwater Level Monitoring.”

4. Section 3.4.4.4, p. 3-8: Please make the following corrections in the first paragraph:
 - Third sentence: Four wells not three are located northeast of Maunabo #1.

- Last sentence: Water levels and rainfall data graphs are presented in Appendix H not F.

Response: The third sentence will be corrected to read: "Four wells are located northeast of Maunabo #1, in the vicinity of PRB: the shallow/deep well cluster of MW-AD/MW-AS, MW-I, and MW-B."

The last sentence in the paragraph will be corrected to read: "Water level and rainfall data graphs were created for each well, and are presented in Appendix H."

5. Section 3.4.4.4, p. 3-8: Could pumping rates or water levels in the pumping wells also be presented to support the interpretations discussed in the section regarding the municipal well effects on water level fluctuations in the monitoring wells?

Response: Pumping rates and water levels in the pumping supply wells were not available from PRASA. The following sentence will be added to the end of the first paragraph in Section 4.4.4.4: "Pumping rates and water level measurements in the supply wells were not available for the long-term water level measurement period."

6. Section 4.2.1.3: Trend Analysis of PRASA Data: Please indicate if pumping rates of the water supply wells and any variability in such were considered in the trend analysis.

Response: No pumping information was available for the years 2006 to 2011 that were included in the trend analysis. The following sentence will be added to the end of the first paragraph in Section 4.2.1.3: "No pumping records were available for the years included in the trend analysis."

7. Section 5.5.2: Monitored Natural Attenuation: Please also include the EPA reference, Technical Protocol for Evaluating Natural Attenuation of Chlorinated Solvents in Ground Water, Sept 1998.

Response: The reference will be added to Section 8 as follows: "EPA. 1998. Technical Protocol for Evaluating Natural Attenuation of Chlorinated Solvents in Groundwater. EPA/600/R-98/128. September."

8. Section 5.5.2.2: Dissolved Oxygen: The document indicates that DO is particularly difficult to determine in groundwater samples since collection methods tend to introduce oxygen. Please clarify if a flow-through cell was used during sampling to minimize the introduction of oxygen.

Response: As indicated in Section 2.1.3.2 Groundwater Sampling, a flow-through cell was used to measure dissolved oxygen in the monitoring well samples. The two wells in Round 2 with anomalously high DO reading referenced in Section 5.5.2.2 (14.8 mg/L at Maunabo-2-R2 and 23.1 mg/L at MW-K-R2) were most likely the result of recording errors in the field.

9. Section 7.2, Recommendations: As discussed previously, this section should identify the need for additional data point(s) in the 1,1,-DCE plume to identify the deeper contaminant distribution between MW-M and the Maunabo #4 well (see cross section E-E' in Figure 4-5).

Response: The following recommendation will be added to Section 7.2: "Additional monitoring wells should be considered during pre-design between MW-M and the Maunabo #4 supply well to track deep 1,1-DCE levels identified in MW-M and T1-I. The monitoring wells would be approximately 110 feet deep."

10. Please provide a table containing the results of the groundwater screening results.

Response: The RI report already includes all the data results for all samples. In Appendix J, the following tables are included for each type of samples (e.g., groundwater screening, monitoring wells, surface water/sediment/pore water): 1) Data summary tables; 2) Hits and exceedance tables; and 3) Full data tables.

11. Figures:

- Figure 3-7 & 3-8: Please consider preparing another similar figure to depict the lithology along a section of the aquifer in the area of the 1,1-DCE plume.
- Figure 4-3: Please provide information in the legend that makes it clear to the reader which data is from direct push sampling (groundwater screening) and which is from monitoring well sampling.

Response: CDM Smith reviewed the available lithologic data collected in the vicinity of the 1,1-DCE plume. There is limited lithologic data in this area due to the lower density of screening points and monitoring wells and the limited lithologic data collected at those locations. Screening location T1-H is the only location in the area that has significant lithologic data (10-foot intervals). Lithologic sampling data for the monitoring wells (MW-M, MW-N, MW-O) is limited to the screened interval. Development of a cross-section will provide little information beyond what is already provided in the T1-H boring log. Because of the limited lithologic data in the 1,1-DCE plume area, CDM Smith does not believe that a cross-section for this area will provide significant value to the RI report. Therefore, we do not recommend preparing an additional figure for this area. CDM Smith will prepare a new figure that depicts the lithology in the area of the 1,1-DCE plume.

CDM Smith will modify Figures 4-2 through 4-5 to distinguish monitoring well results from groundwater screening results. The new symbol or style will be included in the legend in each figure.

Comments from Julie McPherson, EPA Risk Assessor

1. Page 1-4 and 1-5: Considering very limited information was collected from several Areas of potential concern, please clarify the rationale for ruling out several of the locations as possible sources. In addition, please clarify why PA/SI reports were not prepared for several facilities. The discussion should also address the detections of Benzene at Total Gas Station and why this location was not carried through as a potential source area.

Response: Figure 2-1 in the RI report shows the groundwater screening locations that were conducted just downgradient of all the potential source areas summarized in Section 1.4.1. The groundwater screening results allowed CDM Smith to focus on the potential sources of groundwater contamination, as discussed in the RI report.

CDM Smith was not involved with the site when the PA/SI reports were completed. We have no knowledge regarding why PA/SI reports were not prepared for four of the facilities investigated (Total Gas Station, Former Maunabo Landfill, PRASA wastewater treatment plant, and Esso Gas Station).

At the Total Gas Station to the northeast of the Maunabo #1 supply well, CDM Smith installed groundwater screening transect T3, with 5 locations (A through E). Very few volatile organic compounds were detected in all the T3 profile samples and only one slightly exceeded the screening criterion. Benzene was detected at 6 micrograms per liter ($\mu\text{g/L}$) (just above the screening criterion of 5 $\mu\text{g/L}$) in the 13-17-foot sample at T3-D-4. Benzene was not detected in any other T3 screening samples.

The second paragraph in Section 4.2.1.1 will be modified to read as follows: "Site-related contaminants were only detected above the screening criteria in the PRB area, the FSM area, and the Maunabo #4 area; these areas are discussed below. Site-related contaminants were not identified in the T3 screening locations to the far northeast of the Maunabo #1 supply well (Figure 2-1). The T3 transect locations evaluated the potential for contamination from three potential source areas, including Plastic Home Products, the FEMA Storage Facility, and the Total Gas Station. These three potential source areas have been eliminated from further consideration.

In addition to the site-related contaminants, evidence of a gasoline release was found in a limited number of samples. Isopropylbenzene, benzene, and MTBE were detected above the screening criteria in one, one, and three samples, respectively. Benzene and MTBE were no more than 1 $\mu\text{g/L}$ above their respective screening criteria of 5 $\mu\text{g/L}$ and 12 $\mu\text{g/L}$. Isopropylbenzene was detected four times, with a maximum concentration of 350 $\mu\text{g/L}$ (the screening criterion is 68 $\mu\text{g/L}$).

2. Page 4-1; Section 4.1.1: The section describes the selection of screening criteria for various media. For the purposes of the RI, it is appropriate to define nature and extent by applying ARARs/TBCs. However, for the purposes of the risk assessment, the RSLs must be used as the health based screening criteria for all chemicals.

Response: The Human Health Risk Assessment completed by CDM Smith for the Maunabo site utilized the most recent RSLs for the health based screening. No change is necessary to the RI Report.

3. Page 4-2; 2nd paragraph: The paragraph discusses the screening criteria for the surface water areas on the site. Please note that if the surface water is designated as a potable water supply, MCLs must also be considered when discussing the nature and extent of contamination.

Response: The SD surface water classification includes potential use as potable water. CDM Smith compared the surface water sample results against the criteria for groundwater, which are primarily based on MCLs. None of the detected compounds or analytes exceeded or equaled the groundwater criteria. Most of the surface water criteria and groundwater criteria are the same. In a few cases (e.g., cyanide, copper, and zinc) the surface water criteria are more stringent than the groundwater criteria. No changes will be made to the RI report.

4. Page 4-4; Section 4.2.1.1: The text in this section continues to state that there were no detection in certain wells. However, a review of the data shows that Benzene was detected in the screening points but detected below the respective screening value. The text should be clear of other constituents detected in screening wells but below the respective screening criteria.

Response: CDM Smith will thoroughly review Section 4.2, as appropriate, to ensure that wording is clear that contaminant discussions focus on contaminants that exceeded their respective screening

criteria. Detections below screening criteria are not discussed in the text. The text will also be clarified when discussions apply to the site-related contaminants only.

5. Page 4-5; 3rd paragraph: The text states that the PCE results in two wells differed in Round 1 and Round 2 and that CDM does not have high confidence in Round 2 results. The text further states that the results were not considered during analysis. Please clarify if the methods varied for sample collection or analysis from Round 1 and Round 2. Please also clarify if both sampling events from these monitoring wells were incorporated into the human health risk assessment or were the results from Round 2 from these two wells not incorporated into the human health risk assessment.

Response: CDM Smith believes that the results from the two monitoring wells (MW-AD and MW-FD) were inadvertently switched in the field. Based on the results for these two wells from Round 1 and the result for the duplicate sample for MW-FD from Round 2, this is the most likely explanation of the differences between Round 1 and Round 2. The paragraph in the RI report will be modified to read: "Note that the Round 2 PCE results for MW-AD and for MW-FD appear to be inconsistent with Round 1 data and with the general characteristics of the plumes in which each well is located. In MW-AD, the reported result for PCE is below the screening criterion in Round 1, but above in Round 2. The opposite is true for MW-FD. Based on the result for the Round 2 duplicate sample from MW-FD (which is similar to the Round 1 result) CDM Smith believes that the Round 2 results for MW-AD and MW-FD were switched. The Round 2 results for these two wells were not considered during the analysis presented below."

6. Page 4-6; 5th paragraph: The text states that metals are likely due to naturally occurring minerals and not indicative of a metals contamination source or iron or manganese reducing conditions in groundwater. It is recommended that the presence of metals and naturally occurring background conditions be further discussed in the risk characterization section of the risk assessment.

Response: The bedrock in the Maunabo area is composed of the San Lorenzo Batholith, granitic rock that includes a variety of igneous rock types, including granodiorite, diorite, gabbro, and tonalite. These igneous rock types are generally composed of minerals with significant percentage of iron and manganese. The batholith weathers to form the alluvial material within the Maunabo river valley. Therefore, CDM Smith believes that the elevated detections of some metals in groundwater result from the natural alluvial material that has weathered from the igneous bedrock and are not indicative of metal sources of contamination.

This information will be provided to CDM Smith's risk assessors for inclusion in the risk characterization section of the risk assessment.

7. Page 4-7; Section 4.2.1.4: The text states that there were no exceedences of site related contaminants were observed during the RI sampling. Please clarify how often are samples collected and analyzed at this sample location. Please also clarify if Benzene or any other contaminant had exceedences of their respective sampling criteria at the municipal supply wells during the RI.

Response: CDM Smith collected two rounds of samples from the Maunabo #1 supply well, in March 2011 and June 2011. No detected contaminants exceeded their screening criteria. The following VOCs were detected in the Maunabo #1 well. All units below are in micrograms per liter (µg/L) and U indicates not detected with the detection limit specified. Benzene was not detected in either round of sampling at Maunabo #1, with a detection limit of 0.2 µg/L. No SVOCs,

pesticides, or PCBs were detected in this supply well. The full data results for this well and all other samples are provided in Appendix J of the RI report.

<u>Compound</u>	<u>Round 1</u>	<u>Round 2</u>	<u>Screening Criterion</u>
Cis-1,2-dichloroethene	1.6	1.6	70
MTBE	0.55	0.99	12
Bromoform	4.2	0.5 U	43
1,1,2-trichloro-1,2,2-trifluoroethane	5.3	3.8	5,900

The first sentence in Section 4.2.1.4 will be modified to read: "In the Maunabo #1 supply well, no exceedances of the site-related contaminants or any other contaminants were observed during the two rounds of RI sampling."

8. EPA will submit language regarding the vapor intrusion evaluation to be incorporated into the RI.

Response: CDM Smith will incorporate the language provided by EPA into the final RI report.

Comments from Chuck Nace, EPA Risk Assessor

1. Page 2-8, Section 2.4, last sentence: There seems to be something missing from the last sentence. Either a period or additional text.

Response: The word "reconnaissance" was left out. The sentence will be revised to read: "Results of the ecological reconnaissance are provided in Section 3.7, Ecological Reconnaissance."